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ORIGINAL RESEARCH ARTICLE

A reflexive evaluation of technology-enhanced learning

Suzanne Young* and Helen Nichols*

School of Social Sciences, Leeds Beckett University, Leeds, UK

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This article explores the lived experiences of two academics in a UK Higher Education Institution who have embedded digital learning approaches within their curriculum delivery. Achieving student excellence can be impeded by a lack of engagement and sense of identity on large courses. Digital learning strategies can offer opportunities to overcome these challenges by empowering students to engage self-confidently. Through an evaluation of the authors' own experiences of using social media, polling and web-conferencing software, the article shows how interacting with students via a range of learning technologies can create more inclusive and engaging learning environments. Including feedback from students within this article provides evidence that diversification of communication within teaching and learning practice gives students more choice and opportunity to interact with both their peers and teaching staff. The article concludes with recommendations for embedding technology, whilst acknowledging the well-established value of face-to-face interaction.

Keywords: learning technology; digital learning; student engagement; active learning; large cohorts; teaching and learning; social media

Introduction

This article explores the lived experiences of two academics in a UK Higher Education Institution who have embedded digital learning approaches within their curriculum delivery. The aim of this article is to provide a reflexive account of improving student experience through the use of learning technologies and offers insights into how student engagement can be enhanced with such digital tools. 'In general, reflective practice is understood as the process of learning through and from experience towards gaining new insights of self and/or practice' (Finlay 2008, p. 1). As Archer (2000, cited in Dyke, Johnston, and Fuller 2012, p. 832) explains, reflexive practice allows us to think about how social structures and our own individual agency influence our decision-making, which can assist with problem-solving and moving forward in a positive way. Sharing these reflexive practices also benefits those who are experiencing similar issues by offering an insight into how we have introduced new forms of teaching and learning. In this article, the authors reflect on their experiences by discussing problems they encountered and the various digital methods employed to resolve these problems.

The experience of effective digital integration has seen benefits for both staff and students and the authors have witnessed increased engagement of students on large

*Corresponding author. Email: suzanne.young@leedsbeckett.ac.uk, h.e.nichols@leedsbeckett.ac.uk

courses. Although the upward trend in first-year first degree enrolment in UK universities is arguably slight (Higher Education Statistics Agency 2017), certain university courses have experienced a distinct increase in student cohort size. Teaching large cohorts creates a challenge for educators in the university setting to engage students and monitor understanding and short-term progression within individual taught sessions (Saunders and Gale 2012). This problem in particular can have an impact on student experience and arguably teaching experience at the same time. Having the impression that not all students feel a sense of belonging and involvement when being taught in a large class can leave educators unsure of the extent to which their taught sessions have had an impact on all learners. In addition, these large numbers put a strain on university resources, particularly in terms of teaching space, timetabling and staffing. Davies, Mullan, and Feldman (2017) reported that UK universities must invest more in technology-enhanced learning as research indicates that not only can it be financially beneficial but it can also enrich the students' learning experience.

For the purposes of this article, the authors define student engagement according to Exeter et al. (2010, p. 762) who state, 'student engagement refers to the time, energy and resources spent on activities'. These activities can refer to peer discussions, attendance in class, completion of set tasks and preparing for assignments. Both authors have found it challenging to engage students in class discussion, which causes difficulties identifying the students who are grasping the core material and those who are not. Rudduck (1978) highlights this as a common problem arguing that there is a cultural boundary between the tutor and the students that can prevent students from engaging during sessions. Face-to-face learning is not beneficial for all learning preferences; shy or intimidated students are less likely to participate in discussions and activities, as well as students whose first language is not English (Bonk and King 1998; Saunders and Gale 2012).

In particular, both authors have observed in their own teaching practice an increasing reluctance amongst students to communicate vocally in larger class environments. This article contributes to the existing literature on using technology to increase student engagement (see Stowell and Nelson 2007) by addressing how this problem can be alleviated using a variety of learning technologies. It also begins to draw readers' attention to social media as a tool of cause and solution; cause in the relocation of confident communication to online communities, and solution in the increased digital literacy of students meaning that learning technologies are more easily accessible and readily usable. New learning technologies have provided an opportunity to create an engaging environment in larger learning spaces. The now very normal abundance of mobile devices means that students are well placed to use such technologies to interact with educators and make a contribution to taught sessions. The current generation of students are often referred to as Homo Zappiens (Veen and Vrakking 2006) or the Net Generation (Saunders and Gale 2012) due to their prolific use of digital technology. However, the authors recognise that a digital divide still exists due to the growing diversity of students entering higher education. Nevertheless, with over 84% of students in higher education using a smartphone to support their learning (see Newman and Beetham 2017), it is evident that regardless of student diversity, the ownership and use of technological devices has become a significant feature of everyday life. Reflections by the writers have identified that the use of learning technologies enables increased engagement and tackles additional problems associated with teaching large groups. Given that students' communication norms are now marked by 'tweets' and online

chats (Dean and Fornaciari 2014), learning technologies facilitate communication in large settings while doing so in their 'language' (Attwell and Hughes 2010).

2. Literature review

When contemplating the potentially problematic nature of engaging large groups of students (see Mulryan-Kyne 2010), it is important to consider with more clarity the nature of student cohorts in relation to their identities as higher education students and their preferred ways of learning. There is a tendency at times to assume adult age automatically equates to 'adult' learning preferences. Andragogic theory suggests the adult learner is 'ready for learning' (Caruth 2014, p. 1) accompanied by a readiness to engage in terms of the time, energy and resources they spend on activities (Exeter et al. 2010). Although attendance encourages students to participate and enrich their learning experience (Baderin 2005), a large class size can inhibit students' outward willingness to participate vocally.

In the context of teaching strategy, it is suggested that in a large-class scenario, students should be encouraged to ask questions (Staley 2003). Asking questions in lecture theatres holding 150 students however can prove problematic and often daunting for many students, particularly those who are younger and have come to university immediately from secondary and further education institutions where class sizes are usually less than 30. However, it is important for students to continue to engage with their peers as they may have done previously in smaller settings as social interaction, conversation and dialogue are fundamental to learning from a sociocultural perspective as people engage in negotiating meaning (Vygotsky 1978). Wenger (1999) argues that technology-enhanced learning can encourage students to engage in 'communities of practice' by becoming immersed in the learning process. This supports Smith's (1996) move to more student participatory classes, where possible, to achieve greater interaction in university classrooms. Considering this alongside the fact that university students are the most active user demographic of social media (Pewinternet.org 2015), it seems fitting to utilise their technological 'savviness' to create communities of practice by adopting learning technologies that bring together virtual engagement and the face-to-face learning setting (see Papacharissi 2011).

Knowles (1977) suggests that in addition to adults needing to know the 'why' of learning, they also prefer learning which is immediately relevant to their lives. Given the relevance of online interaction in contemporary society, the use of learning technologies adds relevance to current learning experiences in the higher education setting, presenting the educator as a facilitator of learning (Rogers 1983) to achieve a more student-centred approach. Although the tendency to adopt a certain approach or to prefer different ways of being taught may be a useful way of describing differences in students, a more complete explanation would involve recognising the way an individual student's strategy may vary between tasks (Entwistle 1981). Even though the case studies presented in this article are representative of teaching and learning on a degree taught on campus (as opposed to distance learning delivery), the inclusion of learning technologies in class increases accessibility to learning and engagement, particularly for those whose preferred style of learning in large groups does not involve vocal interaction.

Laurillard (2002) discussed the potential value of adopting computer games in educational settings. She acknowledged their usable virtual reality environments, intrinsic feedback, real-time interaction and the responsiveness required from the user. Arguably, the immediate feedback generated by computer games is sufficient to enable

the use to adjust their actions in relation to the goal of the exercise. Like computer games, learning technologies can be used in large lectures to create an exciting, motivating and socially interactive environment with the added value of providing students with immediate feedback. Seemingly, if we do not pursue the adoption of such technologies to provide immersive experiences, the digital age of education will find its own ways of managing without us (Laurillard 2002).

The literature demonstrates the opportunities that learning technologies can provide higher education providers and the potential benefits for students. The authors have both led the piloting of learning technologies within their higher education institution and the remainder of this article will discuss the varying strategies adopted, reflecting on the outcomes and consider future developments.

3. Case studies of technology-enhanced learning

This section outlines four strategies introduced by the authors to engage students on undergraduate degrees in criminology. The class sizes and year groups ranged from over 300 first-year students in some cases to smaller class sizes of around 40 students (and in one example, 12) in their second and third year. In each strategy, the authors reflect on the strengths of these digital tools and provide feedback from students to demonstrate the impact they are having on the learning experience.

3.1. In-class technologies

Large cohort sizes in particular pose challenges for lecturers to engage students face to face whereby students can feel intimidated or detached from the learning experience (see Saunders and Gale 2012). Class-based technologies are those that enable staff to interact with students without relying on students speaking out in class. Applications such as Kahoot!, Polleverywhere and Padlet are commonly used in modules across our undergraduate degrees; however, more widely, half of higher education learners have never used a polling device or an online quiz to give answers in class (Newman and Beetham 2017, p. 14). Polleverywhere is an interactive technology whereby the tutor or lecturer can get real-time answers to questions from students who interact with a web-enabled device. Previous research has shown the benefits of engaging students in web-based polls (Sun, Martinez, and Seli 2014) which offer the option of directly asking students questions encouraging them to interact in classroom or lecture setting. The application allows students to answer questions and take part in polls anonymously, enabling them to interact with the lecturer rather than being passive recipients of information whilst maintaining confidence through lack of overt visibility. DeBaise (2014) notes that such exercises enable students to speak up under the cloak of anonymity and likens this to the feeling of empowerment experienced by Harry Potter when he puts on his invisibility cloak. Padlet is a virtual wall where students can post questions anonymously or have discussions in class using their web-enabled devices. It has proved to be a valuable resource to allow students to ask questions or make comments either at the beginning, during or end of a session. Both authors have found this extremely beneficial to encourage students to ask questions about assignments and exams without them feeling intimidated or embarrassed in front of their peer group. Similar to Stowell and Nelson's (2007) study on the use of clickers, both authors observed more interaction with Padlet

and Polleverywhere than with traditional methods of raising hands. A student using such polls at our own institution commented:

I liked being able to ask questions using my phone 'cause I don't like speaking out. (L4 Criminology student)

Kahoot! (an interactive quiz that students can access on any web-enabled device) is a firm favourite among students and staff members in that it offers a two-way reflexive process. We have used Kahoot quizzes for varying purposes, but mostly as a means to find how much students have learnt on their module, sometimes used part way through a module and at other times at the end of a module. Both authors developed Kahoot! quizzes as an alternative to the traditional end of module review lecture, whereby instead of the lecturer telling students what they *should* have learnt, the quiz allows students to demonstrate what they *have* learnt. There are some key benefits from the approach; firstly students find it fun – they can compete with their peers in the race for the highest score and the anonymous nature means that they can still participate even if they don't think they will necessarily win. Secondly, they have to reflect on what they have learnt in order to answer the questions, encouraging them to recall material and enabling them to identify where their strengths and gaps in knowledge lie. Thirdly, and finally, lecturers can get a sense of how well students have grasped the material from the module, informing them of where more work might be required or where clarification is needed. In this sense, online quizzes, aside from making learning fun, allow students and staff to reflect on the learning and teaching strategy, offering immediate formative feedback and suggestions for improvement.

Game-based learning such as Kahoot! allows students to obtain immediate formative feedback on their learning without posing any risk of embarrassment (Hussein 2015). This has been evident in our student feedback with comments such as:

I liked the quizzes in the lectures, they were fun and the one in the middle of the module helped me see what I needed to work on. (L5 Criminology and Psychology student)

Previous research has indicated that Kahoot scores highly on student satisfaction and enjoyment of their classes (Hussein 2015). In a large module consisting of just under 300 students, we found through their module evaluations that a favourite aspect of the module was the interactive quizzes. Furthermore, this platform encourages collaborative learning, whereby students can work together in pairs or groups to take part in the quizzes, which in turn enriches the learning experiences and helps students retain information for longer (see Chuang 2015). Further comments from students highlight the bringing together of the enjoyable element of such learning technology and the ability to self-assess in a developmental way:

Kahoot quizzes were brilliant. I have used Kahoot quizzes a number of times however I found it particularly helpful for my research module in my second year of study. Whilst playing the quiz, it seemed as though it was just a bit of fun at the end of a complex module, however, it makes you realise very quickly what you have learnt (or what has stayed in your head!) and more importantly what you haven't quite taken in! This was particularly vital for the research module, because it enabled me to realise what I needed to refresh myself with, to apply this to my dissertation in my final and most important year. Taking the quiz enabled me to pinpoint exactly what areas I needed to improve on before embarking on my first major research project. (L5 Criminology student)

3.2. Communicating with social media

Integrating social media into teaching and learning has been shown to enrich the learning experience of students, particularly participatory learners (see Balakrishnan and Lay 2015). Surveys in the United Kingdom suggest that 90% of UK students are regular users of social networking sites on entry to higher education (Melville et al. 2009). The way we choose to communicate with students during the process of learning can benefit from considering how students communicate in the course of their everyday lives. It was noted earlier in this article that there is a need to communicate with students in their 'language'; to do so, this interaction should take place on a user-friendly platform. Connectivist learning theory explains how the Internet can be used as a means to connect students with one another to share information. Described by Siemens (2005) as 'a learning theory for the digital age', connectivism is reflective of underlying social environments which have, in the last 20 years, been reorganised by the emergence of technology. Highlighting the limitations of behaviourism, cognitivism and constructivism, Siemens (2005) proposes that the inclusion of technology in learning activities begins to move learning theories into the digital age. Through the integration of principles explored by chaos, network and complexity and self-organisation theories, connectivism identifies that connection enables individuals to learn more within environments of shifting core elements.

In addition to emails, wikis and social networks, online discussion forums such as Google Communities create an online social space for users to come together. Unlike the built-in discussion forums within virtual learning environments (VLEs), Google Communities more successfully replicate the kind of forums that students are accustomed to using on a day-to-day basis. Having recently adopted the use of a Google Community to maintain contact with students on a small module (12 students), there has been a distinct transformation in experiences of communication, collaboration and integration for both students and staff involved. Despite the obvious advantages brought about by leading a small group of students, such as knowing their names and being able to maintain connection with them more easily, the use of Google Communities brings to life a 'community of practice'. Lave and Wenger (1998) conceptualised this process explaining that people who have a common interest are able to share ideas and work collaboratively. By connecting students as an integrated whole, Google Communities facilitate the development of social capital throughout the learning process. Bourdieu and Wacquant (1992, p. 14) define social capital as 'the sum of the resources, actual or virtual, that accrue to an individual or a group by virtue of possessing a durable network of more or less institutionalized relationships of mutual acquaintance and recognition'. Social capital allows an individual to draw on the resources of others within a given network both in terms of useful information and personal relationships (Ellison, Steinfield, and Lampe 2007). As such, these online shared conversational spaces mediated by mobile devices are conducive to rich peer interactions.

In our own practice, we have observed the organic emergence of a community of individuals who, through formal and informal communication, are achieving both of these elements (useful information and personal relationships) simultaneously. While the Google Community was initially used (primarily by the module leader) as an online notice board to send announcements to the student group, over time individual learners began to make their own contributions. Specifically, learners began to share with one another references to materials useful in supporting each other's learning.

As the module progressed, the use of the Google Community transformed as learners became more confident in their familiarity with one another. Discussions became less formal and learners felt at ease in using the space socially as well as academically. This was reflected upon by a learner who commented:

...the Google Community blurs the line between an academic platform and social media; it was easier to communicate with my dissertation supervisor in a more informal manner which created a space to ask questions that perhaps I would not ask via email.

The transition in the nature of communication within the online space developed and reinforced a sense of group cohesion within which both learners and educators were able to contribute. This too was noted in student feedback:

...because other students' posts were visible within the community, questions were answered in an open space, therefore a lot of collective queries or worries were discussed in a group environment.

While it is necessary to be cautious in blurring the lines between academic and social communication spaces, the learners self-governed such boundaries and on reflection, the organic emergence of both academic *and* social interaction served to create a community underpinned by a culture of support.

3.3. Utilising virtual learning environments

In large modules, it is nearly impossible to adopt teaching strategies that will be meet the needs of all learners. After some thorough investigation into the benefits of blended learning, a first-year undergraduate module was redesigned to replace half of the weekly classroom seminars with asynchronous online activity forums on the VLE. The rationale stemmed from the benefits of blended learning, whereby offering different mechanisms for learning can appeal to larger class numbers that host a variety of learning preferences (see Honey and Mumford 1982). For instance, Fleming's VARK (visual, text, audio and kinaesthetic) model of learning indicates students have different preferences for learning (Fleming 1995) and provides a range of delivery methods, from watching videos, sitting in lectures, group discussions and written tasks, that assist in ensuring that different learners on a course are catered to (Proctor 2003). Graham (2005) identifies three broad key benefits of blended learning; it is cost effective, it increases flexibility in learning and it improves pedagogy. Rennie (2003) also notes that the geographical diversity of students means we ought to consider the accessibility of teaching, and providing e-learning tools is one mechanism of doing this. As such, blended learning has been shown to be beneficial to students, staff and educational institutions (see Bidarra and Rusman 2017; Gulc 2006).

In a module consisting of 320 students, each fortnight students were set a task to complete on the VLE in line with the module learning outcomes and they posted their responses to the task on a designated group discussion board. An allocated seminar tutor was then responsible for providing feedback to each student on the discussion board, offering formative feedback throughout the module to help students identify their strengths and weaknesses. These online activities provided students with an opportunity to engage with problem-solving activities, apply criminological theories to real world crime and criminal justice debates. They also allowed the seminar tutors to

get an insight into how students were progressing, what areas of knowledge required more attention and which topics to focus on during the classroom seminars. The module has been running this way for 2 years now and each year the feedback has been encouraging. Unsurprisingly, about 50% of the students preferred classroom seminars with the other 50% preferring the online activities and this evidence really highlights that in order to achieve student satisfaction and engage students as much as possible, we ought to recognise the various learning preferences of our students. Embedding technology into the module overcame some of the problems of resource allocation and student engagement, whilst keeping the face-to-face contact ensured first-year students still felt supported and were able to engage in learning with their peers.

This asynchronous delivery of teaching does have its limitations and it is very much dependent of the tutors' commitment to provide effective timely feedback. In order to overcome some of these difficulties, particularly having up to six different members of staff contributing to the module, each tutor was given a short deadline for completing the feedback to ensure that all students were fully aware of when they would be responded to. During the first run of this mode of delivery, it was noted that whilst participation in the activities was high in the first few weeks, participation dropped considerably in the latter weeks. Utilising the feedback from students it was clear that feedback needed to be more directed at preparing them for the summative assessment to enable them to identify how the online activities tied in. Constructive alignment (Biggs 1996) appeared to be of importance for the students, whereby they could clearly see the links between the online activities, classroom discussions and final assessment. Thus, in the second run of the module, more clarity was provided on the relationship between the online activities and the summative assessment and tutors were asked to ensure their feedback reflected this. There was greater participation in the online activities in the second run during all the latter weeks with 20% more students completing the last online activities.

3.4. *Web-conferencing lectures*

A further dilemma encountered was the lack of attendance by many students across all three undergraduate year groups, but particularly among second-year undergraduates, who seem most disengaged. Whilst attendance does not necessarily produce engagement, it does encourage students to participate and enrich their learning experience (Baderin 2005); thus, students who engage with teaching materials and feel part of the learning experience have a more enjoyable journey through higher education. Many of the students spoke about their work, family, health and travel commitments that were impacting on their ability to attend all their course classes and as such they felt disengaged from the learning materials and isolated from their peer group. Following the success of blended learning on the first-year module, the opportunity was taken to go one step further and replace all classroom lectures with synchronous online lectures using the web conferencing software, Adobe Connect.

The web conferencing lectures offers numerous benefits to both lecturers and students, in terms of practicalities and techniques for learning. The students can access the lecture anywhere, on any web-enabled device, meaning the restrictions of being on campus are removed. The lectures become interactive, whereby the use of chat boxes, quizzes and polls keep students engaged throughout each lecture; furthermore, the benefit to the lecturer is that you can get immediate responses as

to whether students are understanding the content or not. All of these aspects are important because teaching ought to meet the needs of students and engage them in the learning process in order for them to succeed (Chen et al. 2005). Furthermore, the flexibility and sense of community offered by this approach to blended learning (see Wenger 2000) aims to overcome obstacles to student satisfaction and success present in traditional teaching methods. This interaction is two-way, whereby students are able to ask questions during the lecture and converse with each other on topical issues. Despite being behind a computer screen, you become more engaged with the students using this approach than standing at the front of a room where most would avoid any form of eye contact.

The classroom seminars still remained to ensure the face-to-face contact and more in-depth discussions, but the online lectures have been received with overwhelming supportive feedback. Students have commented on how much more interactive the lectures have become and how they feel part of the experience as opposed to being passive recipients of knowledge. In particular, the ability to ask a question during the lecture from the comfort of their screen and get an immediate response has proved quite popular. The benefits of allowing students to become part of the knowledge production process have been well documented (see Jonassen et al. 2005; Knowles 1977; Rogers 1983) and web-conferencing software enables this process by developing a much greater interactive learning experience as seen in our own student feedback below:

I have found online lectures for this module enjoyable because they are very different to lessons that take place in lecture theatres, and I am more likely to participate in them because I do not need to speak out in front of a group of people. I think that because of this I have gotten a lot more from this module than I would if I was going to traditional lectures because I am sharing my own ideas and asking questions, as well as listening to other people who also wouldn't usually speak out in lectures. (L5 Criminology student).

The module leader engaged with every student individually to make sure they were understanding the module and involved in the discussions. (L5 Criminology student)

A key benefit to this learning technology was the smaller class size, and it is debatable whether such strategy would be as effective with much larger cohorts. It was much easier for the module leader to get to know each individual student due to the number being under 40, resulting in a more personalised learning experience. This meant that the students felt part of the online learning community.

4. Conclusion

Over the past 2 years, we have embedded a range of digital learning technologies within our own teaching practice to diversify and enhance learning experiences for our students. By retrospectively considering our actions to make sense of them (Moon 2001), we recognised that the traditional format for delivering teaching and learning was not inclusive enough for our diverse student cohorts. Using feedback from previous modules, we were able to identify that students required more engagement and interaction in their modules and, importantly, the need to become active learners (see Messineo et al. 2007). Through this reflexive practice, we were able to identify that more creativity in the learning spaces (by embedding technologies that students would be familiar with) could offer a solution to some of the difficulties we had encountered.

Evidently, digital learning technologies play a distinct role in encouraging engagement, particularly in large classes where students tend to disengage with traditional modes of delivery. We are conscious that individual students may feel ‘lost in the crowd’ in large lecture theatres; however, digital technologies can assist with empowering students to find a voice in environments that can leave them feeling isolated. This in turn encourages greater participation and thus improves the learning experience which is evident from the feedback we have received. A further benefit evidenced from the use of digital tools is the creation of communities of practice whereby students have used tools to communicate more effectively with one another both within and outside the classroom setting. In particular, social media and synchronous technologies enable students to converse with each other, support each other and share the learning experience.

Undoubtedly face-to-face interaction is still an important element of teaching and learning but in many ways embedding technology-enhanced learning techniques can improve the face-to-face interaction. For instance, after the web conferencing lectures, students appeared to be more engaging within the classroom, suggesting that some of those barriers referred to by Rudduck (1978) can be overcome with such technologies. Discussions that took place online were easily followed up in the classroom because students had been part of those initial conversations.

Caution must be added that we do not suggest technology-enhanced learning is right for every single module on a course, and any integration of technology should avoid the *wear out effect* (Wang 2015). This is reflected in the very essence of digital pedagogy which is about approaching learning tools from a critical perspective and, thus, also considers when digital tools should *not* be used. Ultimately, digital tools should only serve to enhance learning experiences and cannot replace the value of human interaction (McNeely 2017). Our approach to digital pedagogy therefore is to know when to introduce digital tools to enhance the learning experience whilst recognising when digital tools are less appropriate. From our experiences, the class size will be a key factor in deciding which technologies work most effectively. In-class interactive technologies such as Padlet, Poll Everywhere and Kahoot! certainly appear to be the most beneficial for very large student cohorts, whereby the students can work together and all students receive immediate responses. Asynchronous learning and social media communities work best if students are placed within smaller workable groups, whereby they feel more part of the learning experience and can converse with their peers helping to form communities of practice. To date, we have only incorporated web conferencing into one small (40 students) module; therefore, we cannot comment at this stage on whether it would work as well in particularly large modules. Nevertheless, this mode of delivery has certainly proved to be beneficial with a smaller class size for creating the desired community of practice.

‘Effective technology integration for pedagogy around specific subject matter requires developing sensitivity to the dynamic, transactional relationship between these components of knowledge situated in unique contexts’ (Khoeler 2012). Furthermore, Khoeler (2012) points out that digital tools should be purposeful to the learning environment and should support the content being taught. Student satisfaction is achieved by offering varying strategies of teaching and learning (Beetham, McGill, and Littlejohn 2009), thus incorporating digital activities that offer students the opportunity to participate in active learning.

References

- Attwell, G. & Hughes, J. (2010) *Pedagogic Approaches to Using Technology for Learning*, LLUK [online] Available at: <http://webarchive.nationalarchives.gov.uk/20110414152025/http://www.lluk.org/wp-content/uploads/2011/01/Pedagogical-approaches-for-using-technology-literature-review-january-11-FINAL.pdf>.
- Bidarra, J. & Rusman, E. (2017) 'Key Pedagogical and Technological Factors for Effective Blended Learning Design', in *The Envisioning Report for Empowering Universities*, eds G. Ubachs & L. Konings, The European Association of Distance Teaching Universities (EADTU), Maastricht, The Netherlands.
- Baderin, M.A. (2005) 'Towards Improving Students' Attendance and Quality of Undergraduate Tutorials: A Case Study on Law', *Teaching in Higher Education*, vol. 10, no. 1, pp. 99–116.
- Balakrishnan, V. & Lay, G. C. (2015) 'Students' Learning Styles and Their Effects on the Use of Social Media Technology for Learning', *Telematics and Informatics* [online] Available at: <http://dx.doi.org/10.1016/j.tele.2015.12.004>
- Beetham, H., McGill, L. & Littlejohn, A. (2009) *Thriving in the 21st Century: Learning Literacies for the Digital Age*, Jisc, Glasgow.
- Bidarra, J. & Rusman, E. (2017) 'Key Pedagogical and Technological Factors for Effective Blended Learning Design', in *The Envisioning Report for Empowering Universities*, eds G. Ubachs & L. Konings, The European Association of Distance Teaching Universities (EADTU), The Netherlands.
- Biggs, J. (1996) 'Enhancing Teaching Through Constructive Alignment', *Higher Education*, vol. 32, no. 3, pp. 347–364.
- Bonk, C. J. & King, K. (eds.) (1998) *Electronic Collaborators: Learner-Centered Technologies for Literacy, Apprenticeship, and Discourse*, Lawrence Erlbaum, Mahwah, NJ.
- Bourdieu, P. & Wacquant, L. (1992) *An Invitation to Reflexive Sociology*, University of Chicago Press, Chicago, IL.
- Caruth, G. (2014) 'Learning How to Learn: A Six Point Model for Increasing Student Engagement', *Participatory Educational Research (PER)*, vol. 1, no. 2, pp. 1–12.
- Chen, N., Ko, H., Lin, K. & Lin, T. (2005) 'A Model for Synchronous Learning Using the Internet', *Innovations in Education and Teaching International*, vol. 42, no. 2, pp. 181–194.
- Chuang, Y. (2015) 'SSCLS: A Smartphone-Supported Collaborative Learning System', *Telematics and Informatics*, vol. 32, no. 3, pp. 463–474.
- Davies, S., Mullan, J. & Feldman, P. (2017) *Rebooting Learning for the Digital Age: What Next for Technology Enhanced Higher Education?* HEPI Report 93, Higher Education Policy Institute, Oxford.
- Dean, K. L. & Fornaciari, C. J. (2014) 'The 21st Century Syllabus: Tips for Putting Andragogy Into Practice', *Journal of Management Education*, vol. 38, no. 5, pp. 724–732.
- DeBaise, J. (2014) 'Best Practices: Thoughts on a Flash Mob Mentality', in *Hybrid Pedagogy: A Digital Journal of Learning, Teaching and Technology* [online]. Available at: <http://www.digitalpedagogylab.com/hybridped/best-practices-thoughts-flash-mob-mentality/#respond>
- Dyke, M., Johnston, B. & Fuller, A. (2012) 'Approaches to Reflexivity: Navigating Educational and Career Pathways', *British Journal of Sociology of Education*, vol. 33, no. 6, pp. 831–848.
- Ellison, N., Steinfield, C. & Lampe, C. (2007) 'The Benefits of Facebook "Friends": Social Capital and College Students' Use of Online Social Network Sites', *Journal of Computer-Mediated Communication*, vol. 12, no. 4, pp. 1143–1168.
- Entwistle, N. (1981) *Styles of Learning and Teaching: An Integrated Outline of Educational Psychology for Students, Teachers and Lecturers*, Wiley, Chichester.
- Exeter, D., et al., (2010) 'Student Engagement in Very Large Classes: The Teachers' Perspective', *Studies in Higher Education*, vol. 35, no. 7, pp. 761–775.
- Finlay, L. (2008) *Reflecting on Reflective Practice*, PBPL Paper 52, Milton Keynes, Open University.
- Fleming, N. D. (1995) *I'm Different; Not Dumb. Modes of Presentation (VARK) in the Tertiary Classroom*, in *Research and Development in Higher Education, Proceedings of the 1995*

- Annual Conference of the Higher Education and Research Development Society of Australasia (HERDSA)*, ed A. Zelter, vol. 18, HERDSA, pp. 308–313.
- Graham, A. (2005) 'Blended Learning Systems: Definitions, Current Trends and Future Directions', in *Handbook of Blended Learning: Global Perspectives, Local Designs*, eds C. J. Bonk & C. R. Graham, Pfeiffer Publishing, San Francisco, CA, pp. 3–21.
- Gulc, E. (2006) *Using Blended Learning to Accommodate Different Learning Styles*, Higher Education Academy. Accessed at: <https://www.heacademy.ac.uk/system/files/2917.pdf>
- Higher Education Statistics Agency. (2017;) *Higher Education Student Enrolments and Qualifications Obtained at Higher Education Providers in the United Kingdom 2015/16 | HESA*, [online] Available at: <https://www.hesa.ac.uk/news/12-01-2017/sfr242-student-enrolments-and-qualifications>
- Honey, P. & Mumford, A. (1982). *Manual of Learning Styles*, P. Honey, London.
- Hussein, B. A. (2015) 'A Blended Learning Approach to Teaching Project Management: A Model for Active Participation and Involvement: Insights from Norway', *Education Sciences*, vol. 5, no. 2, pp. 104–125.
- Jonassen, D. H., Lee, C. B., Yang, C.–C. & Laffey, J. (2005) 'The Collaboration Principle in Multimedia Learning', in *The Cambridge Handbook of Multimedia Learning*, ed R. E. Mayer, Cambridge University Press, Cambridge, pp. 547–575.
- Khoeler, M. (2012) *TPACK Explained*, [online] Available at: <http://matt-koehler.com/tpack2/tpack-explained/>
- Knowles, M. S. (1977) *The Modern Practice of Adult Education: Andragogy vs. Pedagogy*, Association Press, New York.
- Laurillard, D. (2002;) *Rethinking University Teaching*, 2nd edn, Routledge, London.
- Lave, J. & Wenger, E. (1998) *Communities of Practice: Learning, Meaning, and Identity*, Cambridge University Press, Cambridge.
- McNeely, B. (2017) *Using Technology as a Learning Tool, Not Just the Cool New Thing*, Ed-ucause, [online] Available at: <https://www.educause.edu/research-and-publications/books/educating-net-generation/using-technology-learning-tool-not-just-cool-new-thing>
- Melville, D., et al., (2009) *Higher Education in a Web 2.0 World*, [online] Available at: <http://www.jisc.ac.uk/media/documents/publications/heweb20rptv1.pdf>
- Messineo, M., et al., (2007) 'Inexperienced Versus Experienced Students' Expectations for Active Learning in Large Classes', *College Teaching*, vol. 55, no. 3, pp. 125–133.
- Moon, J. (2001) 'PDP Working Paper 4: Reflection In Higher Education Learning', The Higher Education Academy. [online] Available at: http://www.heacademy.ac.uk/assets/York/documents/resources/resourcedatabase/id72_Reflection_in_Higher_Education_Learning.rtf
- Mulryan-Kyne, C. (2010) 'Teaching Large Classes at College and University Level: Challenges and Opportunities', *Teaching in Higher Education*, vol. 15, no. 2, pp. 175–185.
- Newman, T. & Beetham, H. (2017) *Student Digital Experience Tracker 2017: The Voice of 22,000 UK Learners*, Jisc, Bristol.
- Papacharissi, Z. (2011) *A Networked Self*, Routledge, New York.
- Pewinternet.org. (2015) *Who Uses Social Networking Sites*, [online] Available at: <http://www.pewinternet.org/files/2013/12/who-uses-sns.png>
- Proctor, C. (2003) 'Blended Learning in Practice', *Conference Proceedings Education in a Changing Environment*, 17th–18th September, Salford, University of Salford.
- Rennie, F. (2003) 'The Use of Flexible Learning Resources for Geographically Distributed Rural Students', *Distance Education*, vol. 24, no. 1, pp. 25–39.
- Rogers, C. R. (1983) *Freedom to Learn for the 1980s*, C.E. Merrill Pub. Co, Columbus, OH.
- Rudduck, J. (1978) 'Interaction in Small Group Work', *Studies in Higher Education*, vol. 3, no. 1, pp. 37–43.
- Saunders, F. C. & Gale, A. W. (2012) 'Digital or Didactic: Using Learning Technology to Confront the Challenge of Large Cohort Teaching', *British Journal of Educational Technology*, vol. 43 no. 6, pp. 847–858.

- Siemens, G. (2005) 'Connectivism: A Learning Theory for the Digital Age', *International Journal of Instructional Technology and Distance Learning*, vol. 2 no. 1, pp. 3–10.
- Smith, D. H. (1996) 'Developing a More Interactive Classroom: A Continuing Odyssey', *Teaching Sociology*, vol. 24, no. 1, pp. 64–75.
- Staley, C. (2003) *50 Ways to Leave your Lectern*, Wadsworth Publishing, London.
- Stowell, J. R. & Nelson, J.M. (2007) 'Benefits of Electronic Audience Response Systems on Student Participation, Learning and Emotion', *Teaching of Psychology*, vol. 34 no. 4, pp. 253–258.
- Sun, J. C.-Y., Martinez, B. & Seli, H. (2014) 'Just-in-Time or Plenty-of-Time Teaching? Different Electronic Feedback Devices and Their Effect on Student Engagement', *Educational Technology & Society*, vol. 17, no. 2, pp. 234–244.
- Veen, W. & Vrakking, B. (2006) *Homo Zappiens: Growing Up in a Digital Age*, Continuum International Publishing Group, Stafford.
- Vygotsky, L. S. (1978) *Mind in Society: The Development of Higher Psychological Processes*, Harvard University Press, Cambridge, MA.
- Wang, A.I. (2015) 'The Wear Out Effect of a Game-Based Student Response System', *Computers and Education*, vol. 82, pp. 217–227.
- Wenger, E. (1999) *Communities of Practice*, 1st edn, Cambridge University Press, Cambridge.
- Wenger, E. (2000) 'Communities of Practice and Social Learning Systems', *Organization*, vol.7, no. 2, pp. 225–246.